HANDSFREE DESKTOP CHARGER – CHH–8P

AMENDMENT RECORD SHEET

Amendment Number	Date	Inserted By	Comments

Handsfree Desktop Charger CHH–8P

Contents

HF Desktop Charger CHH–8P Page 4
General Page 4
User Interface Features Page 5
Charging Indication Page 5
Charge States and Charge Control Page 5
Instructions for Use Page 6
Charging the Phone Battery Page 6
Charging the Extra Battery Page 6
Deep Discharging of the Extra Battery Page 7
Handsfree Function Page 7
Using the Voice Mail Page 7
The Data Connection Page 7
Technical Specifications Page 8
Modes of Operation Page 8
External/Internal Signals and Connections Page 8
Functional Description Page 13
Supply Voltages Page 13
Control Logic Page 13
Port A Signals of the Processor Page 14
Port B Signals of the Processor Page 14
Port C Signals of the Processor Page 14
Port D Signals of the Processor Page 15
Port F Signals of the Processor Page 15
Processor A/D Inputs Page 15
Watchdog Circuits Page 16
Battery Charging Page 16
Spare Battery Discharging Page 16
Microphone Amplifier and Corresponding Switches Page 17
Speaker Amplifier and Corresponding Swithes Page 17
Block Diagram of CHH–8 Page 18
Circuit Diagram of DC3 Power Supply and Control Module Page 19
Circuit Diagram of DC3 Audio Switches and Amplifiers Page 20
Circuit Diagram of Connector Module DC4 Page 21
Layout and Foil Diagrams of DC4 Page 23
Parts List of DC3 Code: 0200211 Page 24
Parts List of DC4 Code: 0200235 Page 31
Exploded View Page 32
Assembly Parts Page 33

HF Desktop Charger CHH–8P

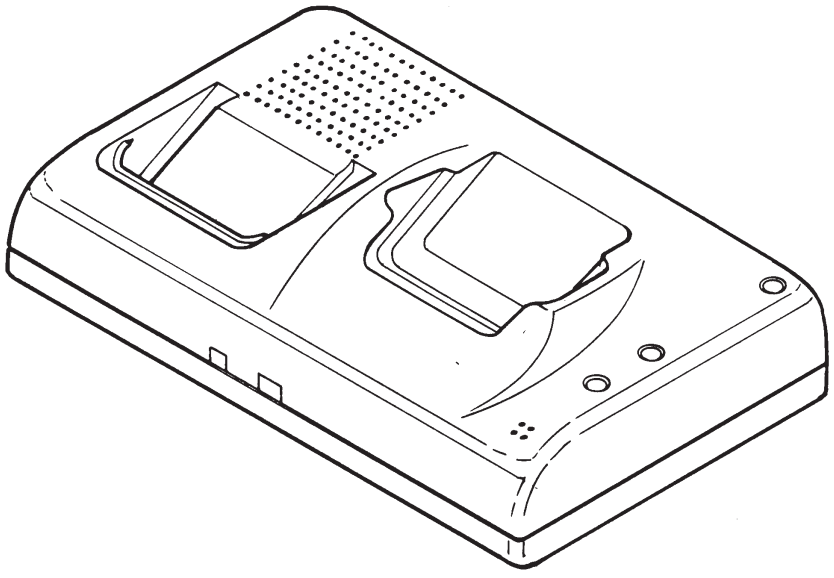
Related Documentation

		circuit diagram of DC3
		circuit diagram of DC4
	9853931	layout & foil diagr. DC3
	9853930	layout & foil diagr. DC4
6E	0200211	parts list of DC3
6E	0200235	parts list of DC4
S	0675026	exploded view
	0260218	mechanics

General

The HF desktop charger CHH–8P is for the second generation digital handportable telephones. HF desktop charger is designed for charging the handportable phone and the spare battery. It provides handsfree function when the phone is on the charger and there is also a connector for data accessories. CHH–8P is designed for to be used in the office environment with the power supply ACS–6.

CHH–8P consists of spare battery charging control processor, charging indicators and switching mode power supply for charging the phone and the spare battery. The unit has inbuilt HF speaker and HF microphone but the actual handsfree function is generated in the phone. There are also three operating buttons. The front one is for muting the microphone during a call, the middle one is for the voice mail listening and the rear one is for the spare battery discharge.



User Interface Features

HF desktop charger is designed for charging the handportable phone and the spare battery. It provides also handsfree function when the phone is on the charger. The unit has inbuilt HF speaker and HF microphone but the actual handsfree function is generated in the phone. There are also three operating buttons. The front one is for muting the HF microphone, the middle one is for the voice mail listening and the rear one is for the spare battery discharging.

Charging takes place at a battery temperatures of 5...45 Centigrade. Charge control of the phone is done with phone microprocessor and charge control of extra battery is done with separate microprocessor located in a desktop stand. Phone is always charged first, then extra battery.

A battery gives better capacity if it is occasionally discharged completely. User can do this by using the ‘deep discharge‘ –feature of CHH–8P. This feature is provided only extra battery slot and pressing the ‘discharge‘ –button. The extra battery will then automatically be discharged and charged to full. If this button is pressed twice then the discharge function is cancelled.

Charging Indication

Charge is indicated with two dual–colors led‘s, one for the phone and one for the extra battery pack. The liquid–crystal display of the phone also contains a three–bar battery display.

Leds are dimmed when there is no phone or extra battery connected.

Right led for handportable:

Red phone led indicates a fast charge mode of the phone battery.

Green phone led indicates that the phone battery is full and tricle charge mode is on.

Left led for spare battery:

Red spare battery led indicates that the battery is not full; either there is a fast charge mode active or charging is disabled due to a battery temperature or to fast charge mode of the phone.

Green spare battery led indicates that the battery is full.

Flashing red spare battery led indicates that a discharge cycle is activated.

Charge States and Charge Control

Charge current for the phone is supplied through a series switch transistor in the phone. When this transistor is on the charger is supplying a constant current to the phone. This is the rapid charge mode.

When the transistor is off no current is supplied to the phone and the charger is in the constant voltage mode.

Having been charged up in the rapid charge mode, the battery is kept in full charge using pulsed charging, i.e. switching power alternately on and off at a variable duty cycle and a frequency of a few Hz.

The desktop charger is also provided with control logic for spare battery charging, which is allowed when no phone is connected or when the phone is in the pulsed charge mode.

Instructions for Use

Plug in the ACS–6 AC power supply to the mains outlet. Connect the cord from ACS–6 to the dc connector at the rear of the CHH–8 HF desktop charger.

Charging the Phone Battery

Place the phone into the recess in the charger. The right–hand indicator at the front edge of the charger shows the charge of the phone battery. The red led is lit during quick charging, and once the phone battery has reached full charge, the green led alights, showing that only trickle charging is on.

When the phone is powered, the charge can be read from three indicator bars appearing on the phone display. During the quick charging phase, each bar is lit alternately for one second. Once the battery is fully charged all three bars are lit. If the charger indicator is not lit when the phone is on the charger, ensure that the phone is properly in place and that the power supply is correctly plugged to the charger and to the wall outlet.

The battery will not accept charge if its temperature is below +5 C or above +45 C.

Charging the Extra Battery

Place the extra battery into the recess in the charger. The left hand indicator of the charger shows battery charge. During quick charging, the red indicator is lit and once the battery has reached full charge, the green indicator alights showing trickle charging. If the phone and the extra battery are on the charger at the same time the phone battery is charged first, followed by charging of the extra battery.

If the charger indicator is off when the extra battery is installed on the charger, ensure that the extra battery is properly in place and that the power supply is correctly plugged in to the charger and to the wall outlet.

The battery will not accept charge at a temperature of below +5 C or above +45 C.

Deep Discharging of the Extra Battery

In the interests of best possible battery efficiency, it is recommended that the battery be deep discharged once a week or so.

To start the deep discharge function, press once the discharge key at the rear of the charger, whereupon the red indicator showing extra battery charging starts to flash. Once the battery has been discharged, the charger will automatically start charging it. Should you wish to interrupt discharging, press the discharge key again. The indicator ceases to flash and the charger will resume battery charging. It is not recommendable to deep discharge a fully charged battery.

Handsfree Function

When installed in the charging stand, the phone is always in the handsfree mode of operation. The internal HF speaker and HF microphone are then activated for the call. It is also possible to turn the phone into HF mode and off while a call is going on. This is done by removing the phone or placing it on the charger.

HF speaker volume is adjusted at the phone volume key, and an outgoing call can be muted by presssing at the mute key on the front edge of the charger. The muted state is indicated by the message ”MUTED” on the phone display. Pressing the key once more cancels muting, shown by the text ”UNMUTED” which appears on the display for a moment.

Using the Voice Mail

The voice–mail key in the middle of the charger is for calling one’s voice mailbox in the network switching centre and listening to voice messages. When calling the voice mailbox, the first press on the key makes the call to the mailbox and the second ends the call.

The Data Connection

The charger contains a 10–pin modular connector for data accessories (e.g. PCMCIA card).

Technical Specifications

Modes of Operation

Power off mode:	If the unit doesn't receive power supply to the d.c. connector there isn't any voltage on the module.
Standby mode:	The unit receives supply voltage to the d.c. connector. The processor is running but because there isn't any phone or spare battery on the cradle, the charger is off and the audio functions are inactive.
Active mode:	The telephone or spare battery is on the cradle so the charging functions are active. Normally the handsfree speaker is muted. During a call and during the key beeps or alarming tones the speaker and corresponding audio switches are open.

External/Internal Signals and Connections

The charger has four external and three internal connectors, the AC fast charger connector, the spare battery connector, phone system connector, the data accessory connector, internal system connector, internal speaker connector and internal microphone connector.

AC Fast Charger Connector X100

Pin:	Line:	Function:
1	VDC	Supply voltage
2	DGND	Power supply ground

Spare Battery Connector X101

Pin:	Line:	Function:
1, 2, 3	GND	Supply power ground
4	BTEMP	Battery temperature sensing
5	BSI	Battery size identification
6, 7, 8	VBAT	Charging voltage

Phone System Connector X701

Pin:	Line:	Function:
1	DGND	Power supply ground
2	XMIC	Microphone signal
3	AGND	Analog ground
4	TDA	Transmitted data
5	M2BUS	Serial bidirection bus
6	HOOK	Not used
7	PHFS	Not used
8	VC	Supply/charging
9	DGND	Power supply ground
10	XEAR/HFJWR	Earphone signal/CHH–8 power switch
11	DSYNC	Data syncronisation
12	RDA	Received data
13	BIND	Not used
14	VF	Not used
15	DCLK	Data clock
16	VC	Supply/charging

Data Accessory Connector X510

Pin:	Line:	Function:
1	DSYNC	Datasyncronisation
2	+VD	Supply voltage
3	DGND	Supply power good
4	M2BUS	Serial bidirection data
5	RDA	Received data
6	TDA	Transmitted data
7	AGND	Analog ground
8	XMIC	Microphone signal
9	XEAR	Earphone signal
10	DCLK	Data clock

Internal System Connector X500/DC3, X700/DC4

Pin:	Line:	Function:
1, 2	VC	Supply/charging
3	+5V	
4	PHFS	Not used
5	DGND	Power supply ground
6	DSYNC	Data syncronisation
7	DCLK	
8	TDA	Transmitted data
9	RDA	Received data
10	DGND	Power supply ground
11	M2BUS	Serial bidirection bus
12, 14	AGND	Analog ground
13	XEAR	Earphone signal
14	AGND	Analog groud
15	XMIC	Microphone signal
16	AGND	Analog ground
17, 18	DGND	Power supply ground

Internal Speaker Connector X460/DC3

Pin:	Line:	Function:
1	HFSPK	HF speaker signal
2	AGND	Analog ground

External Microphone Connector X440/DC3

Pin:	Line:	Function:
1	HFMIC	HF microphone signal
2	AGND	Analog ground

Supply Voltages and Power Consumption on the Connectors of CHH–8

Symbol:	Description:	Values:
VDC	Supply voltage	
	• input voltage min/typ/max:	*11.0...13.8...20.0 V*
	• input power max:	*13 W*
VBAT	Spare battery voltage	
	• charging volt. min/typ/max:	*11.0...12.2...13.0 V*
	• charging curr. min/typ/max:	*730...800...870 mA*
	• discharg. volt. min/typ/max:	*5.0...6.0...7.5 V*
	• discharg. curr. min/typ/max:	*130...160...200 mA*
VC	Charging voltage	
	• output voltage min/typ/max:	*11.0....12.2...13.0 V*
	• output current min/typ/max:	*730...800...870 mA*
VD	Data signal	
	• output voltage min/typ/max:	*9.5...10.0...10.5 V*
	• output current max:	*50 mA*

Supply Voltages and Power Consumption on the DC3 Module

Symbol:	Description:	Values:
+VL	Supply voltage for LED's	
	• voltage min/typ/max:	*11.0...13.8...20 V*
	• current max:	*50 mA*
+VCC	Cahrging voltage for the battery	
	• voltage min/typ/max:	*10.3...11.5...13.3 V*
	• current min/typ/max:	*730...800...870 mA*
+VE	Supply for empty battery	
	• voltage min/typ/max:	*4.9...5.0...5.1 V*
	• current max:	*100 mA*
+5V	Supply for 5 V logic parts	
	• voltage min/typ/max:	*4.9...5.0...5.1 V*
	• current max:	*50 mA*
+VA	Supply for analog power switch	
	• voltage min/typ/max:	*9.6...10.0...10.4 V*
	• current max:	*200 mA*
+VAN	Supply for analog parts	
	• voltage min/typ/max:	*4.9...5.0...5.1 V*
	• current max:	*20 mA*
+VAS	Switched supply for speaker amp.	
	• voltage min/typ/max:	*9.3...9.7...10.1 V*
	• current max:	*200 mA*

+VREF	Ref. voltage for analog parts	
	• voltage min/typ/max:	*2.4...2.4...3.1 V*
	• current max:	*5 mA*

Supply Voltages and Power Consumption on the DC4 Module

Symbol:	Description:	Values:
+5V	Supply for 5 V logic parts	
	• voltage min/typ/max:	*4.75...5.0...5.25 V*
	• current max:	*15 mA*

AC Characteristic (1 kHz)

Symbol:	Description:	Values:
XMIC	External microphone signal	
	• Cable level:	*200 mV_{RMS}*
	• 0 dBmO:	*415 mV_{RMS}*
HFMIC	Handsfree microhone signal	
	• MRP, mic ref point.:	*+15.3 dBPa 50 cm*
	• HFMIC, about 20 dB atten.:	*–4.7 dBPa*
	• Gain for HFMIC:	*40 dB*
	• Cable level:	*200 mV_{RMS}*
XEAR	External earphone signal	
	• Cable level:	*130 mV_{RMS}*
	• 0 dBmO:	*411 mV_{RMS}*
HFSP	Handsfree speaker signal	
	• Cable level:	*130 mV_{RMS}*
	• Gain for HFSP:	*17 dB*

Functional Description

The DC3 module electronics consists of the following functional blocks:

- Supply voltages
- Control logic
- Battery charging
- Spare battery discharging
- Watchdog circuit
- Microphone amplifier and corresponding switches
- Speaker amplifier and corresponding switches

Supply Voltages

The supply voltage +VI (11.0 V– 20.0 V) for the DC3– and DC4–modules is taken from the power supply connector X100 connected to the Power Supply ACS–6.

The battery charging voltage +VCC (10.0 V – 13.0 V) is connected to the phone or to the spare battery.

+VE voltage (5.0 V) is generated by the regulator N150 to charge totally empty battery to the +5.0 V level.

+VA voltage (10.0 V) is the supply for the analog parts. From that voltage are generated also analog voltages +VAN (5.0 V) and +VAS (10.0 V). Reference voltage +VREF (2.75 V) for the analog is made by the N430–A from the +VAN voltage.

+5V voltage is the supply for digital parts, generated by the regulator N103.

Control Logic

The phone battery and spare battery charging indication, spare battery charging and discharging, audio connections and activation of voice mail are controlled by processor D300. It is a single–chip type controller incorporating RAM, ROM, A/D converter and a multifunction timer/counter.

The processor communicates with the handphone via the M2BUS. The M2BUS interface comprises transistors V200, V201 and corresponding resistors.

Port A Signals of the Processor

Port A:	Function:
PA0: PHONE GREEN (out)	Phone LED control, green: ”1”
PA1: PHONE RED (out)	Phone LED control, red: ”1”
PA2: SPARE GREEN (out)	Spare battery LED control, green: ”1”
PA3: SPARE RED (out)	Spare battery LED control, red: ”1”
PA4: DISCHRG BUTTON (in)	Discharge button control, ”0”: start discharge
PA5: SPARE DISCHRG (out)	Discharge spare battery, ”1”: discharge enabled
PA6: AUDIO POWER (out)	Audio power switch, ”1”: power on
PA7: CHARGER (out)	Charger switch, ”1”: charger on

Port B Signals of the Processor

Port B:	Function:
PB0: SERVICE J301 (out)	
PB1: SERVICE J302 (out)	
PB2: SERVICE J303 (out)	
PB3: SERVICE J304 (out)	
PB4: SERVICE J305 (out)	NC
PB5: VOICE MAIL (in)	Voice mail listening, ”0”: activation
PB6: HFMIC MUTE (in)	HF microphone muting, ”0”: activation
PB7: Unused	NC

Port C Signals of the Processor

Port C:	Function:
PC0: TXD (out)	M2BUS transmit
PC1: RXD (in)	M2BUS receive
PC2: Unused	NC
PC3: TRXDINT (in)	M2BUS interrupt
PC4: DVCE0 (in)	Device type, ”1”
PC5: DVCE1 (in)	Device type, ”0”
PC6: SPARE CHARGE (out)	Spare battery charging, ”1”: charging on
PC7: WTCHDOG (out)	Watchdog reset, ”01010...”: reseting on

Port D Signals of the Processor

Port D:	Function:
PD0: PHONE MIC (out)	Analog switch, ”1”: phone mic switched on
PD1: ACC MIC (out)	Analog switch, ”1”: accessory mic switched on
PD2: HF MIC (out)	Analog switch, ”1”: HF mic swithed on
PD3: PHONE EAR (out)	Analog switch, ”1”: phone ear swithed on
PD4: ACC EAR (out)	Analog switch, ”1”: accessory ear swithed on
PD5: HF SPK (out)	Analog switch, ”1”: HF speaker swithed on
PD6: Unused	NC
PD7: Unused	NC

Port F Signals of the Processor

Not used.

Processor A/D Inputs

Name:	Function:
AN0: VBATL	Battery voltage • range: 0...11 V • resolution 43 mV/bit
AN1: VBATH	High resolution battery voltage • range: 7.0...11 V • resolution 16 mV/bit
AN2: PHOCURDET	Phone current detect • PDET = ”1” for A/D value higher than 5 • PDET = ”0” for A/D value or less
AN3: BATTEMP	Battery temperature, 27 kΩ pull–up resistor to +5 V reference supply
AN4: BATTSZ	Battery size, 100 kΩ pull–up resistor to +5 V reference supply
AN5: CHRGVOLT	Charger voltage detection
AN6: PWR	Phone connection detection
AN7: LIREF	Lithium battery detection

Watchdog Circuits

Under normal operation the processor is pulsating the WTCHDOG–line to reseting the ”power off”– and ”software reset”–watchdogs.
If the processor doesn’t run correctly, then the transistor V210 turns off and the ”Software reset”–watchdog V211 gives reset pulse through C211 to the RESET–line. If after this reseting the processor still runs incorrectly, then the ”Power off”–watchdog (V212, V213) turns off the +5 V regulator N103.

Battery Charging

Charging current for the phone battery is fed in via transistor V311, which is always on when the phone is connected to the system connector X701 on the DC4 module. Phone battery charging state is indicated by the red (V344, V345) and green (V333) leds. Because the phone and the spare battery cannot be charged at the same time the charging current of the phone must be detected and this is done with the current mirror V321 and corresponding resistors.

Charging current for the spare battery is fed in via switching transistor V221 and schotky diode V220. The transistor is controlled by the processor (SPARE CHARGE –line). When the phone battery is not charged and it is allowed to charge the spare battery, the transistor is on and a constant current is supplied to the battery (the red led V331 lits). In the pulsed charging mode the charging current is adjusted by pulsating this charge current (the green led V330 lits).

Spare battery voltage and ΔV–voltage are determined by reading the VBAT line state. Voltages are measured through resistor divider R250 / R251 and the amplifier N250–B.

Spare battery size is determined by reading the BSI line state. This is pulled to +5 V reference voltage by R243. In the battery pack a ”size” resistor is connected between BSI and GND.

Temperature is measured over the BTEMP line. This line is pulled to +5 V reference voltage by R242. In the battery pack an NTC resistor is connected between BTEMP and GND.

Spare Battery Discharging

The desktop charger is also provided with a discharge function. This is activated by pressing the discharge button S300. Resistors R230–R237 determines the discharge current which is fed through switching transistor V230 controlled by the processor. The discharging is indicated by blinking of the red led V331. The battery is discharged to +5 V and thereafter charged normally to full.

Microphone Amplifier and Corresponding Switches

Transistor amplifier circuit V420 and corresponding resistors and capasitors supplies bias current for microphone. Operational amplifier N430–B is used to amplify the microphone signal to the handphone. The gain of this amplifier is about 40 dB. The HF microphone signal is fed to the phone through the analog switches D400–B and D400–C. The microphone signal XMIC from the Data Accessory (X510) is fed to the phone through the switches D400–A and D400–C. The supply voltage for the amplifier and the analog switched are taken from the +VAN regulator N102. The +VREF reference voltage (≅ +2.75 V) is made with the N430–A from the +VAN analog voltage (≅ +5.0 V) .

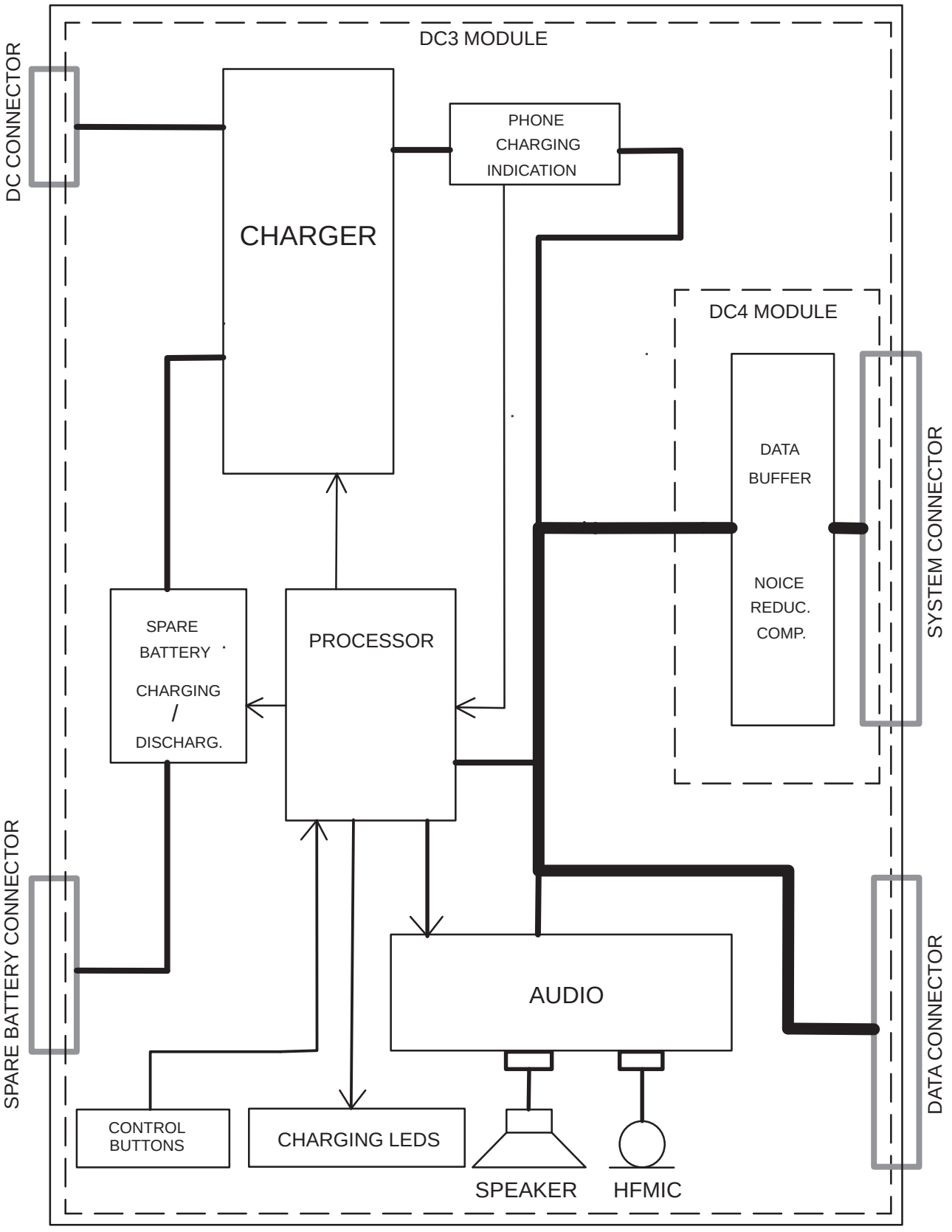
Speaker Amplifier and Corresponding Swithes

XEAR signal from the phone is fed to the HF speaker through the analog swithes D410–C and D410–B. The signal is amplified about 17 dB with the resistors R460, R461 and the amplifier N460. The speaker can be muted with the MUTE–signal controlled by the prosessor.

XEAR signal from the phone can be fed to the Data Accessory (X510) through the analog switches D410–C and D410–A.

The supply voltage +VAS (≅ +9.7 V) for the speaker amplifier is taken through the transistor V341, controlled by the processor, from the +VA regulator N100 (≅+10.0 V).

Block Diagram of CHH–8

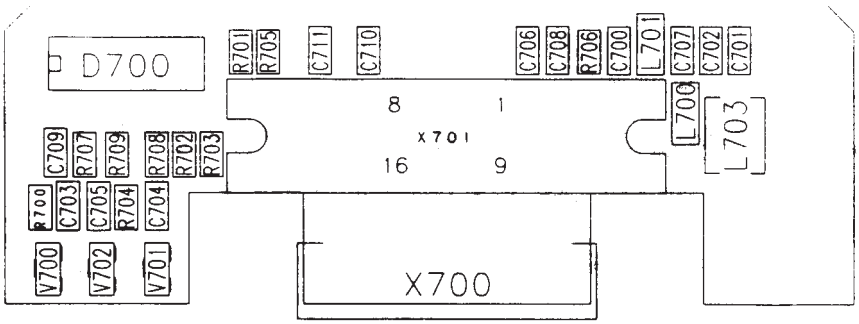


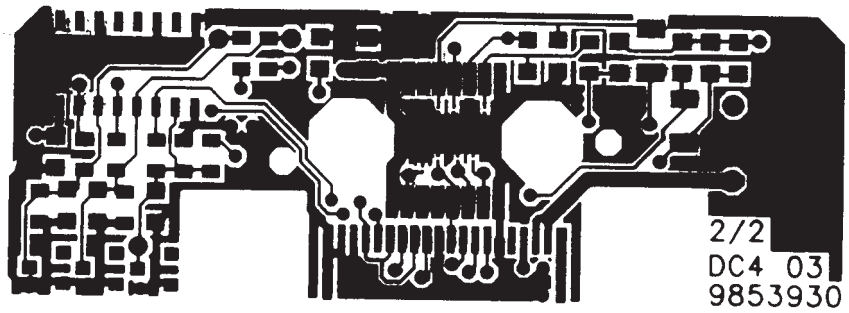
Circuit Diagram of DC3 Power Supply and Control Module

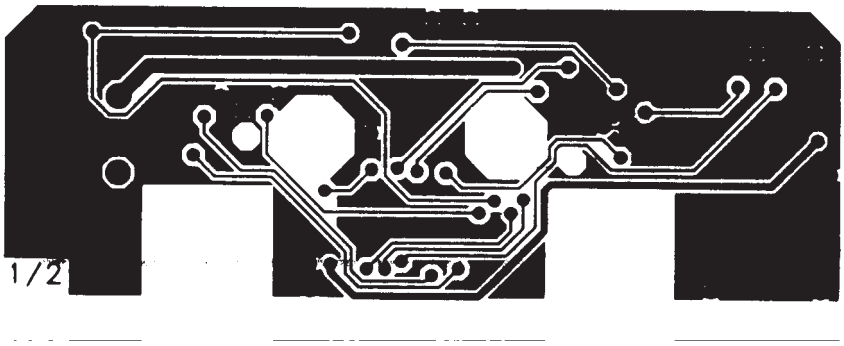
Circuit Diagram of DC3 Audio Switches and Amplifiers

Circuit Diagram of Connector Module DC4

Layout and Foil Diagrams of DC4







Parts List of DC3

Code: 0200211

ITEM	CODE	DESCRIPTION	VALUE	TYPE
R103	1411123	Melf resistor	0.22	5 % 0.2 W 0204
R116	1414452	Chip resistor	10.0 k	1 % 0.063 W 0805
R117	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R118	1415600	Melf resistor	1.0 k	1 % 0.2 W 0204
R119	1412423	Chip resistor	4.7 k	5 % 0.063 W 0805
R120	1415784	Melf resistor	4.75 k	1 % 0.2 W 0204
R122	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R123	1415600	Melf resistor	1.0 k	1 % 0.2 W 0204
R127	1414420	Chip resistor	680 k	5 % 0.063 W 0805
R130	1411669	Chip resistor	22	5 % 0.063 W 0805
R200	1412430	Chip resistor	10 k	5 % 0.063 W 0805
R201	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R202	1412729	Chip resistor	33 k	5 % 0.063 W 0805
R203	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R204	1412430	Chip resistor	10 k	5 % 0.063 W 0805
R205	1413917	Chip resistor	150	5 % 0.063 W 0805
R206	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R209	1412423	Chip resistor	4.7 k	5 % 0.063 W 0805
R215	1412536	Chip resistor	22 k	5 % 0.063 W 0805
R216	1414533	Chip resistor	56 k	1 % 0.063 W 0805
R218	1412536	Chip resistor	22 k	5 % 0.063 W 0805
R219	1421108	Melf resistor	30.1 k	1 % 0.2 W 0204
R220	1413917	Chip resistor	150	5 % 0.063 W 0805
R221	1413917	Chip resistor	150	5 % 0.063 W 0805
R222	1413603	Chip resistor	47 k	5 % 0.063 W 0805
R223	1412423	Chip resistor	4.7 k	5 % 0.063 W 0805
R230	1415576	Melf resistor	301	1 % 0.2 W 0204
R231	1415576	Melf resistor	301	1 % 0.2 W 0204
R232	1415576	Melf resistor	301	1 % 0.2 W 0204
R233	1415576	Melf resistor	301	1 % 0.2 W 0204
R234	1415576	Melf resistor	301	1 % 0.2 W 0204
R235	1415576	Melf resistor	301	1 % 0.2 W 0204
R236	1415576	Melf resistor	301	1 % 0.2 W 0204
R237	1415576	Melf resistor	301	1 % 0.2 W 0204
R238	1412430	Chip resistor	10 k	5 % 0.063 W 0805
R240	1414533	Chip resistor	56 k	1 % 0.063 W 0805
R241	1414452	Chip resistor	10.0 k	1 % 0.063 W 0805
R242	1415664	Melf resistor	27.4 k	1 % 0.2 W 0204
R243	1414283	Chip resistor	100 k	1 % 0.063 W 0805
R244	1412423	Chip resistor	4.7 k	5 % 0.063 W 0805
R245	1413603	Chip resistor	47 k	5 % 0.063 W 0805
R246	1413603	Chip resistor	47 k	5 % 0.063 W 0805
R247	1416107	Melf resistor	5.62 k	1 % 0.2 W 0204

R248	1416040	Melf resistor	56.2 k	1 % 0.2 W 0204
R249	1413603	Chip resistor	47 k	5 % 0.063 W 0805
R250	1416160	Melf resistor	100 k	1 % 0.2 W 0204
R251	1416202	Melf resistor	121 k	1 % 0.2 W 0204
R252	1416040	Melf resistor	56.2 k	1 % 0.2 W 0204
R253	1416160	Melf resistor	100 k	1 % 0.2 W 0204
R254	1413603	Chip resistor	47 k	5 % 0.063 W 0805
R255	1413603	Chip resistor	47 k	5 % 0.063 W 0805
R256	1414124	Chip resistor	120 k	5 % 0.063 W 0805
R257	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R258	1412430	Chip resistor	10 k	5 % 0.063 W 0805
R300	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R301	1412729	Chip resistor	33 k	5 % 0.063 W 0805
R302	1412423	Chip resistor	4.7 k	5 % 0.063 W 0805
R303	1412423	Chip resistor	4.7 k	5 % 0.063 W 0805
R304	1412423	Chip resistor	4.7 k	5 % 0.063 W 0805
R310	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R311	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R312	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R313	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R314	1412335	Chip resistor	1.0 k	5 % 0.063 W 0805
R315	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R320	1414533	Chip resistor	56 k	1 % 0.063 W 0805
R321	1414283	Chip resistor	100 k	1 % 0.063 W 0805
R322	1413829	Chip resistor	10	5 % 0.063 W 0805
R323	1414283	Chip resistor	100 k	1 % 0.063 W 0805
R324	1414533	Chip resistor	56 k	1 % 0.063 W 0805
R330	1412536	Chip resistor	22 k	5 % 0.063 W 0805
R331	1412536	Chip resistor	22 k	5 % 0.063 W 0805
R335	1412536	Chip resistor	22 k	5 % 0.063 W 0805
R336	1412536	Chip resistor	22 k	5 % 0.063 W 0805
R337	1412254	Chip resistor	270	5 % 0.063 W 0805
R338	1412198	Chip resistor	56	5 % 0.063 W 0805
R339	1412254	Chip resistor	270	5 % 0.063 W 0805
R341	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R400	1413917	Chip resistor	150	5 % 0.063 W 0805
R401	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R402	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R403	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R404	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R405	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R406	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R410	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R411	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R412	1413917	Chip resistor	150	5 % 0.063 W 0805
R413	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R414	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R415	1413635	Chip resistor	100 k	5 % 0.063 W 0805

R416	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R420	1414043	Chip resistor	1.8 k	5 % 0.063 W 0805
R421	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R430	1412729	Chip resistor	33 k	5 % 0.063 W 0805
R431	1412729	Chip resistor	33 k	5 % 0.063 W 0805
R440	1413917	Chip resistor	150	5 % 0.063 W 0805
R441	1413917	Chip resistor	150	5 % 0.063 W 0805
R442	1413603	Chip resistor	47 k	5 % 0.063 W 0805
R443	1414109	Chip resistor	15 k	5 % 0.063 W 0805
R444	1414109	Chip resistor	15 k	5 % 0.063 W 0805
R445	1412303	Chip resistor	330	5 % 0.063 W 0805
R446	1412729	Chip resistor	33 k	5 % 0.063 W 0805
R447	1413917	Chip resistor	150	5 % 0.063 W 0805
R460	1413610	Chip resistor	68 k	5 % 0.063 W 0805
R461	1414452	Chip resistor	10.0 k	1 % 0.063 W 0805
R462	1412423	Chip resistor	4.7 k	5 % 0.063 W 0805
R463	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R464	1413850	Chip resistor	4.7	5 % 0.063 W 0805
R500	1412430	Chip resistor	10 k	5 % 0.063 W 0805
R501	1412430	Chip resistor	10 k	5 % 0.063 W 0805
R502	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R520	1412423	Chip resistor	4.7 k	5 % 0.063 W 0805
R530	1413836	Chip resistor	47	5 % 0.063 W 0805
R533	1413836	Chip resistor	47	5 % 0.063 W 0805
R534	1412303	Chip resistor	330	5 % 0.063 W 0805
C100	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C101	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C103	2309517	Ceramic cap.	100 n	10 % 50 V 1206
C104	2501605	Electrol. cap.	100 µ	20 % 35 V RM3.5
C109	2501605	Electrol. cap.	100 µ	20 % 35 V RM3.5
C110	2309517	Ceramic cap.	100 n	10 % 50 V 1206
C111	2502736	Electrol. cap.	220 µ	20 % 16 V 3.5MM
C112	2502736	Electrol. cap.	220 µ	20 % 16 V 3.5MM
C114	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C115	2310752	Ceramic cap.	10 n	20 % 50 V 0805
C116	2604431	Tantalum cap.	10 µ	20 % 16 V 6.0x3.2x2.8
C117	2604209	Tantalum cap.	1.0 µ	20 % 16 V 3.2x1.6x1.8
C118	2502736	Electrol. cap.	220 µ	20 % 16 V 3.5MM
C119	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C120	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C121	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C122	2309517	Ceramic cap.	100 n	10 % 50 V 1206
C123	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C124	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C128	2310752	Ceramic cap.	10 n	20 % 50 V 0805
C129	2309884	Ceramic cap.	4.7 p	0.25 % 50 V 0805
C150	2310544	Ceramic cap.	1.0 n	5 % 50 V 0805
C151	2309517	Ceramic cap.	100 n	10 % 50 V 1206

C152	2604431	Tantalum cap.	10 µ	20 % 16 V 6.0x3.2x2.8
C153	2604431	Tantalum cap.	10 µ	20 % 16 V 6.0x3.2x2.8
C160	2310449	Ceramic cap.	150 p	5 % 50 V 0805
C210	2502736	Electrol. cap.	220 µ	20 % 16 V 3.5MM
C211	2604209	Tantalum cap.	1.0 µ	20 % 16 V 3.2x1.6x1.8
C212	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C213	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C220	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C240	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C241	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C242	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C243	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C244	2309517	Ceramic cap.	100 n	10 % 50 V 1206
C250	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C251	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C252	2310449	Ceramic cap.	150 p	5 % 50 V 0805
C253	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C300	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C301	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C302	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C303	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C310	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C320	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C340	2310544	Ceramic cap.	1.0 n	5 % 50 V 0805
C341	2309517	Ceramic cap.	100 n	10 % 50 V 1206
C342	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C343	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C400	2604209	Tantalum cap.	1.0 µ	20 % 16 V 3.2x1.6x1.8
C401	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C402	2604209	Tantalum cap.	1.0 µ	20 % 16 V 3.2x1.6x1.8
C403	2604209	Tantalum cap.	1.0 µ	20 % 16 V 3.2x1.6x1.8
C404	2604209	Tantalum cap.	1.0 µ	20 % 16 V 3.2x1.6x1.8
C405	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C410	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C411	2604209	Tantalum cap.	1.0 µ	20 % 16 V 3.2x1.6x1.8
C412	2604209	Tantalum cap.	1.0 µ	20 % 16 V 3.2x1.6x1.8
C413	2604209	Tantalum cap.	1.0 µ	20 % 16 V 3.2x1.6x1.8
C414	2604209	Tantalum cap.	1.0 µ	20 % 16 V 3.2x1.6x1.8
C415	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C420	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C421	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C422	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C423	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C424	2604209	Tantalum cap.	1.0 µ	20 % 16 V 3.2x1.6x1.8
C430	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C431	2604209	Tantalum cap.	1.0 µ	20 % 16 V 3.2x1.6x1.8
C432	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C440	2310343	Ceramic cap.	22 p	5 % 50 V 0805

C441	2310752	Ceramic cap.	10 n	20 % 50 V 0805
C442	2604431	Tantalum cap.	10 µ	20 % 16 V 6.0x3.2x2.8
C443	2310752	Ceramic cap.	10 n	20 % 50 V 0805
C444	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C445	2310544	Ceramic cap.	1.0 n	5 % 50 V 0805
C446	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C447	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C448	2310544	Ceramic cap.	1.0 n	5 % 50 V 0805
C449	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C450	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C451	2604209	Tantalum cap.	1.0 µ	20 % 16 V 3.2x1.6x1.8
C452	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C460	2604209	Tantalum cap.	1.0 µ	20 % 16 V 3.2x1.6x1.8
C461	2310738	Ceramic cap.	4.7 n	20 % 50 V 0805
C463	2604209	Tantalum cap.	1.0 µ	20 % 16 V 3.2x1.6x1.8
C464	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C465	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C466	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C467	2604431	Tantalum cap.	10 µ	20 % 16 V 6.0x3.2x2.8
C468	2604431	Tantalum cap.	10 µ	20 % 16 V 6.0x3.2x2.8
C469	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C470	2502736	Electrol. cap.	220 µ	20 % 16 V 3.5MM
C471	2309517	Ceramic cap.	100 n	10 % 50 V 1206
C472	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C473	2310784	Ceramic cap.	100 n	10 % 25 V 0805
C500	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C501	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C510	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C511	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C512	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C513	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C514	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C515	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C516	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C517	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C520	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C521	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C522	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C523	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C550	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C551	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C552	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C553	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C554	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C555	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C556	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C599	2604209	Tantalum cap.	1.0 µ	20 % 16 V 3.2x1.6x1.8
C600	2309517	Ceramic cap.	100 n	10 % 50 V 1206

L100	3606946	Ferrite bead 0.2 Ω 26 Ω/100 MHz		1206
L101	3606946	Ferrite bead 0.2 Ω 26 Ω/100 MHz		1206
L104	3606946	Ferrite bead 0.2 Ω 26 Ω/100 MHz		1206
L105	3606946	Ferrite bead 0.2 Ω 26 Ω/100 MHz		1206
L106	3608519	Chip coil	1.2 µ	5 % 1206
L107	3608519	Chip coil	1.2 µ	5 % 1206
L108	3607555	Coil	125 µ	2 A
L109	0164030	Choke	9 µ	
L500	3606946	Ferrite bead 0.2 Ω 26 Ω/100 MHz		1206
L501	3608519	Chip coil	1.2 µ	5 % 1206
L502	3606946	Ferrite bead 0.2 Ω 26 Ω/100 MHz		1206
L503	3608519	Chip coil	1.2 µ	5 % 1206
B301	4500822	Crystal	11.0592 M	CL30PF H=3.6 mm
V100	4113828	Trans. supr.	28 V	28 A 600 W DO214AA
V102	4215954	MosFet	RFD14N05	n–ch 50 V 10 A TO252
V103	4107027	Zener diode	BZX84	5 % 16 V 0.3 W SOT23
V104	4210106	Transistor	BSR19	npn 14 V 0.6 A SOT23
V106	4200917	Transistor	BC848B/BCW32	npn 30 V 100 mA SOT23
V108	4210108	Transistor	BSR20	pnp 12 V 0.6 A SOT23
V110	4107160	Zener diode	BZX84	5 % 12 V 0.3 W SOT23
V114	4108639	Diode x 2	BAS28	75 V 250 mA SOT143
V115	4108639	Diode x 2	BAS28	75 V 250 mA SOT143
V117	4107027	Zener diode	BZX84	5 % 16 V 0.3 W SOT23
V120	4107027	Zener diode	BZX84	5 % 16 V 0.3 W SOT23
V121	4108639	Diode x 2	BAS28	75 V 250 mA SOT143
V200	4200917	Transistor	BC848B/BCW32	npn 30 V 100 mA SOT23
V201	4200917	Transistor	BC848B/BCW32	npn 30 V 100 mA SOT23
V212	4108639	Diode x 2	BAS28	75 V 250 mA SOT143
V213	4110074	Schottky diode	STPS340U	40 V 3 A SOD6
V220	4110074	Schottky diode	STPS340U	40 V 3 A SOD6
V221	4210020	Transistor	BCP69–25	pnp 20 V SOT223
V222	4200917	Transistor	BC848B/BCW32	npn 30 V 100 mA SOT23
V230	4200226	Darl. transistor	BCV27	npn 30 V 300 mA SOT23
V240	4100567	Sch. diode x 2	BAS70–04	70V15 mA SERSOT23
V250	4100567	Sch. diode x 2	BAS70–04	70V15 mA SERSOT23
V310	4200909	Transistor	BC858B/BCW30	pnp 30 V 100 mA SOT23
V311	4210020	Transistor	BCP69–25	pnp 20 V SOT223
V312	4200917	Transistor	BC848B/BCW32	npn 30 V 100 mA SOT23
V320	4110074	Schottky diode	STPS340U	40 V 3 A SOD6
V330	4864378	Led	Green	2.2 V 0805
V331	4864380	Led	Red	0805
V333	4864378	Led	Green	2.2 V 0805
V334	4864380	Led	Red	0805
V335	4864380	Led	Red	0805
V336	4200917	Transistor	BC848B/BCW32	npn 30 V 100 mA SOT23
V337	4200917	Transistor	BC848B/BCW32	npn 30 V 100 mA SOT23
V338	4200917	Transistor	BC848B/BCW32	npn 30 V 100 mA SOT23
V339	4200917	Transistor	BC848B/BCW32	npn 30 V 100 mA SOT23

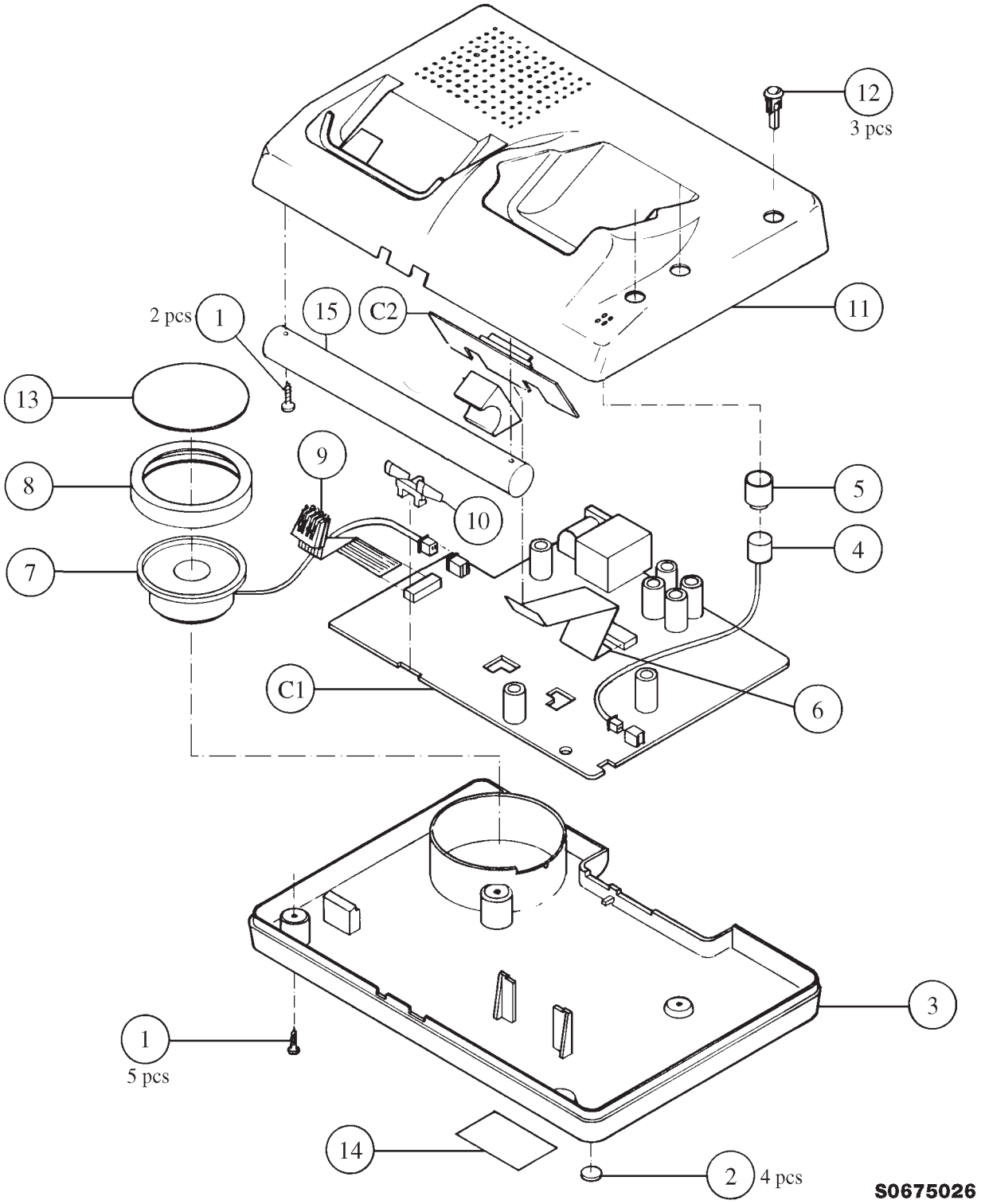
V341	4108639	Diode x 2	BAS28Ω	75 V 250 mA SOT143
V420	4200917	Transistor	BC848B/BCW32	npn 30 V 100 mA SOT23
V460	4200909	Transistor	BC858B/BCW30	pnp 30 V 100 mA SOT23
D300	4340034	IC, RAM	MCU16/8	QFP64
D400	4309488	IC, 4 x bi.switch	74HC4066	SO14S
D410	4309488	IC, 4 x bi.switch	74HC4066	SO14S
N100	4309222	IC, regulator	L4810	0.4 A SOT82
N101	4305236	IC, 2 x comp.	LM2903	SO8S
N102	4375012	IC, PSL p–supp	NMP75012	SO20
N103	4301062	IC, regulator	LP2951AC	SO8S
N250	4309576	IC, 2 x op.amp.	TLC27M2I	SO8
N430	4309576	IC, 2 x op.amp.	TLC27M2I	SO8
N460	4309022	IC, AF amp 1 W 4 Ω 15 V	TDA7233	SO8
S300	5200914	Push button switch 2–pole 6x7 smd		SMD
S301	5200914	Push button switch 2–pole 6x7 smd		SMD
S302	5200914	Push button switch 2–pole 6x7 smd		SMD
X100	5414943	Dc–jack d6.3/2		pcb
X101	5431702	Flexfoil connect 1x08 1 mm		smd
X440	5416640	Connector 2–pole right angle 1.5		1.5
X460	5416640	Connector 2–pole right angle 1.5		1.5
X500	5431704	Flexfoil connect 1x18 0.8 mm		smd
X510	5401050	Modular jack 10 shielded		pcb
	6500001	Crystal insulating plate		HC–49/U
	9380149	Sticker brady lat–2–747 9.5x9.5		
	9853931	PC board	DC3	94.0x123.9x1.6 m6 2/pa

Parts List of DC4

Code: 0200235

ITEM	CODE	DESCRIPTION	VALUE	TYPE
R700	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R701	1412335	Chip resistor	1.0 k	5 % 0.063 W 0805
R702	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R703	1412335	Chip resistor	1.0 k	5 % 0.063 W 0805
R704	1413635	Chip resistor	100 k	5 % 0.063 W 0805
R705	1412335	Chip resistor	1.0 k	5 % 0.063 W 0805
R706	1413917	Chip resistor	150	5 % 0.063 W 0805
C700	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C701	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C706	2310752	Ceramic cap.	10 n	20 % 50 V 0805
C707	2310752	Ceramic cap.	10 n	20 % 50 V 0805
C708	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C709	2307816	Ceramic cap.	47 n	20 % 25 V 0805
C710	2310343	Ceramic cap.	22 p	5 % 50 V 0805
C711	2310343	Ceramic cap.	22 p	5 % 50 V 0805
L700	3606946	Ferrite bead 0.2 Ω 26 Ω/100 MHz		1206
L701	3608519	Chip coil	1.2 µ	5 % 1206
L703	0164030	Choke	9 µ	
V700	4108639	Diode x 2	BAS28	75 V 250 mA SOT143
V701	4108639	Diode x 2	BAS28	75 V 250 mA SOT143
V702	4108639	Diode x 2	BAS28	75 V 250 mA SOT143
D700	4340858	IC, 8xh/l level shift so1	74HC4050	SO16S
X700	5431704	Flexfoil connect 1x18 0.8 mm		smd
X701	5469778	Accessory connector hd720		smd
	9853930	PC board	DC4	22.0x60.0x1.6 d 15/pa

Exploded View



Assembly Parts

ITEM	Q'TY	CODE	DESCRIPTION	VALUE, TYPE
1	7	6293042	PT screw	KB22x8 FeZn clr
2	4	6501067	Adhesive foot	d=8 h=2 clr
3		9450258	Bottom cover	1D 23095
4		5140444	Cond. microphone	63 ±2 dB
5		9460012	Microphone pad	4D 21140
6		7133162	Flex foil	18x0.5 0.8 mm clr
7		5140460	Loudspeaker	8 Ω 2 W d=45 h=19
8		9460054	Speaker seal ring	3D 22231
9		5409552	Battery connector with flex	
10		9460088	Light guide	3D 22994
11		9450257	Front cover	1D 23094
12	3	9460087	Discharge button	4D 22992
13		9480052	Speaker screen	4D 22694
14		9380154	Type label	4D 22419
15		9560009	Ballast	4D 23334
C1		0200211	DC3 module	
C2		0200235	DC4 module	

This page intentionally left blank.